

In re Patent Application of:  
SOLIE  
Serial No. 10/784,365  
Filed: FEBRUARY 23, 2004

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IN THE CLAIMS:

Claims 1-4 (Cancelled).

5. (Currently Amended) A high bandwidth feed-forward oscillator for generating a sawtooth waveform at a prescribed frequency, said sawtooth waveform undergoing successive excursions between respective ones of a set of peak and valley portions  $V_{peak}$  and  $V_{valley}$ , comprising:

an input port to which a variable input voltage  $V_{in}$  is coupled;

an output port from which said sawtooth waveform is derived;

a network coupled to said input port and being configured to output said peak voltage value  $V_{peak}$  for said sawtooth output voltage in proportion to a difference between said input voltage  $V_{in}$  and said valley voltage  $V_{valley}$ ;

an amplifier having a first input port coupled to said network and a second input port coupled to receive a voltage value corresponding to said valley voltage value  $V_{valley}$  for said sawtooth output voltage;

a current mirror circuit which is coupled to be driven by said ~~first-comparator~~ amplifier and is operative to produce a current  $I$  in proportion to the voltage difference ( $V_{in} - V_{valley}$ );

a capacitor coupled to said output port and being alternately charged and discharged by said current  $I$ ; and

a switching circuit which is operative to supply said current  $I$  to said capacitor and thereby charge said capacitor until the voltage across said capacitor reaches said peak voltage value  $V_{peak}$ , and thereafter sink said current  $I$  from said capacitor and thereby discharge said capacitor until the voltage across said capacitor reaches said valley voltage value  $V_{valley}$ .

6. (Original) The high bandwidth feed-forward oscillator

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according to claim 5, wherein said switching circuit comprises a first comparator having a first input coupled to receive said peak voltage value, and a second input coupled to said output port, a second comparator having a first input coupled to receive said valley voltage value, and a second input coupled to said output port, and a control circuit which is operative to couple said current I to said capacitor and thereby charge said capacitor until the voltage at said output port reaches said peak voltage value  $V_{peak}$ , thereby causing said first comparator to change state, and thereafter sink said current I from said capacitor and thereby discharge said capacitor until the voltage at said output port reaches said voltage value  $V_{valley}$ , thereby causing said second comparator to change state.

7. (Original) The high bandwidth feed-forward oscillator according to claim 6, wherein said switching circuit further comprises a flip-flop having a first input coupled to the output of said first comparator and a second input coupled to the output of said second comparator, and an output coupled to steer a charge/discharge path for said capacitor between respective current source and sinks for said current I.

8. (Original) The high bandwidth feed-forward oscillator according to claim 5, further comprising temperature compensation circuitry for adjusting said current I produced by said current mirror circuit.

9. (Original) The high bandwidth feed-forward oscillator according to claim 8, wherein said temperature compensation circuitry includes a temperature-compensated phase locked loop, which is operative to augment the value of said current I produced by said current mirror circuit and used to source and sink current through said charge/discharge path for said capacitor.

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10. (Currently Amended) A circuit for generating a sawtooth waveform at a prescribed frequency, said sawtooth waveform undergoing successive excursions between respective ones of a set of peak and valley portions  $V_{peak}$  and  $V_{valley}$ , said circuit comprising:

a comparator network which is operative to establish said difference between said set of peak and valley portions in accordance with an input voltage  $V_{in}$ ; and

a control circuit which is operative, in response to a change in said input voltage  $V_{in}$ , to modify the value of said difference between said peak and valley portions and thereby define a new set of respective peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$ , and to immediately cause said sawtooth waveform to transition from said set of respective peak and valley portions  $V_{peak}$  and  $V_{valley}$  to said new set of respective peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$  at said prescribed frequency, without undergoing excursions between peak and valley portions other than said new set of peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$ , respectively; and wherein

said comparator network comprises an input port to which a variable input voltage  $V_{in}$  is coupled, and including a voltage divider network that is operative to output said peak voltage value  $V_{peak}$  for said sawtooth output voltage in proportion to a difference between said input voltage  $V_{in}$  and said valley voltage  $V_{valley}$ , and including an amplifier having a first input port coupled to said voltage divider network and a second input port coupled to receive a voltage value corresponding to said valley voltage value  $V_{valley}$  for said sawtooth output voltage, and a current mirror circuit which is coupled to be driven by said first comparator and is operative to produce a current  $I$  in proportion to the voltage difference ( $V_{in}-V_{valley}$ ); and wherein

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said control circuit includes a capacitor coupled to said output port and being alternately charged and discharged by said current I, and a switching circuit which is operative to supply said current I to said capacitor and thereby charge said capacitor until the voltage across said capacitor reaches said peak voltage value  $V_{peak}$ , and thereafter sink said current I from said capacitor and thereby discharge said capacitor until the voltage across said capacitor reaches said valley voltage value  $V_{valley}$ .

11. (Original) The circuit according to claim 10, wherein said comparator network is operative to establish said difference between said set of peak and valley portions  $V_{peak}$  and  $V_{valley}$  in proportion to the difference between said input voltage  $V_{in}$  and said valley voltage  $V_{valley}$ .

12. (Original) The circuit according to claim 11, wherein said control circuit is operative, in response to said change in said input voltage  $V_{in}$ , to successively charge and discharge a capacitor with a current that is proportional to  $(V_{in_{NEW}} - V_{valley_{NEW}})$ , with the voltage across said capacitor corresponding to said sawtooth waveform.

Claims 13-14 (Cancelled).

15. (Currently Amended) The circuit according to claim ~~14~~10, wherein said switching circuit comprises a first comparator having a first input coupled to receive said peak voltage value, and a second input coupled to said output port, a second comparator having a first input coupled to receive said valley voltage value, and a second input coupled to said output port, and a control circuit which is operative to couple said current I to said capacitor and thereby charge said capacitor until the voltage at said output port reaches said peak voltage value  $V_{peak}$ , thereby

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causing said first comparator to change state, and thereafter sink said current I from said capacitor and thereby discharge said capacitor until the voltage at said output port reaches said voltage value  $V_{valley}$ , thereby causing said second comparator to change state.

16. (Original) The circuit according to claim 15, wherein said switching circuit further comprises a flip-flop having a first input coupled to the output of said first comparator and a second input coupled to the output of said second comparator, and an output coupled to steer a charge/discharge path for said capacitor between respective current source and sinks for said current I.

17. (Currently Amended) The circuit according to claim ~~14~~10, further comprising temperature compensation circuitry for adjusting said current I produced by said current mirror circuit.

18. (Original) The circuit according to claim 17, wherein said temperature compensation circuitry includes a temperature-compensated phase locked loop, which is operative to augment the value of said current I produced by said current mirror circuit and used to source and sink current through said charge/discharge path for said capacitor.

Claim 19 (Cancelled).

20. (New) A circuit for generating a sawtooth waveform at a prescribed frequency, said sawtooth waveform undergoing successive excursions between respective ones of a set of peak and valley portions  $V_{peak}$  and  $V_{valley}$ , said circuit comprising:

a comparator network which is operative to establish said difference between said set of peak and valley portions in

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accordance with an input voltage  $V_{in}$ ; and

a control circuit which is operative, in response to a change in said input voltage  $V_{in}$ , to modify the value of said difference between said peak and valley portions and thereby define a new set of respective peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$ , and to immediately cause said sawtooth waveform to transition from said set of respective peak and valley portions  $V_{peak}$  and  $V_{valley}$  to said new set of respective peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$  at said prescribed frequency, without undergoing excursions between peak and valley portions other than said new set of peak and valley portions  $V_{peak_{NEW}}$  and  $V_{valley_{NEW}}$ , respectively; and wherein

said comparator network comprises an input port to which a variable input voltage  $V_{in}$  is coupled, and including a voltage divider network that is operative to output said peak voltage value  $V_{peak}$  for said sawtooth output voltage in proportion to a difference between said input voltage  $V_{in}$  and said valley voltage  $V_{valley}$ , and including a MOSFET having a gate and drain thereof shorted together and coupled to said voltage divider network coupled to receive a voltage value corresponding to said valley voltage value  $V_{valley}$  for said sawtooth output voltage, and a current mirror circuit which is coupled to be driven by said first comparator and is operative to produce a current  $I$  in proportion to the voltage difference ( $V_{in}-V_{valley}$ ); and wherein

said control circuit includes a capacitor coupled to said output port and being alternately charged and discharged by said current  $I$ , and a switching circuit which is operative to supply said current  $I$  to said capacitor and thereby charge said capacitor until the voltage across said capacitor reaches said peak voltage value  $V_{peak}$ , and thereafter sink said current  $I$  from said capacitor and thereby discharge said capacitor until the voltage across said capacitor reaches said valley voltage value  $V_{valley}$ .